Corning® X-LAB® System for Closed, Sterile PBMC Recovery

Application Note

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Introduction

Research and therapies involving the human immune system rely heavily on peripheral blood mononuclear cells (PBMCs) isolated from whole blood sources. Typical methods of PBMC isolation involve density gradient centrifugation or expensive, fully automated systems. Although density gradient centrifugation is often employed, the process is labor-intensive, has lower sample volume capacity, and is not easily adaptable to closed or automated systems. The Corning X-LAB system is designed to isolate and harvest PBMCs from blood and blood products in a closed, sterile device that is automation-friendly. Here we demonstrate high recovery and purity of PBMCs from 240 mL of whole blood from multiple donors using the Corning X-LAB system. Our results show that the X-LAB system can deplete more than 99% of red blood cells and 80% of platelets.

Materials and Methods

Fresh, whole blood containing Anticoagulant Citrate Dextrose Solution A from healthy donors was provided by AllCells. Upon arrival, the blood was placed on a Corning LSE™ platform rocker (Corning Cat. No. 6703) for at least 1 hour. Once the blood reached room temperature (25°C), 240 mL was transferred to a Corning X-LAB disposable cartridge (Corning Cat. No. 6924). A 500 µL sample was removed to be counted on the Beckman Coulter DxH 520 hematology analyzer for reference. The system was centrifuged using a Thermo Scientific Sorvall™ Legend™ X1 centrifuge. After processing, PBMCs were harvested from the X-LAB disposable cartridge with a 5 mL syringe followed by a 2 mL phosphate buffer saline (PBS) wash. Recovered PBMC volume in harvest chamber was then measured and cells were counted.

Results and Discussion

Figure 1 shows that recovery of PBMCs using the X-LAB system was at the high end of what is typically recovered from density gradient centrifugation. Typical PBMC yields from density gradient centrifugation are between 0.5 to 2 x 10^6 cells per milliliter of whole blood[1]. Comparing PBMC occurrence in whole blood to PBMCs after isolation, shows high recovery from 4 donors (Figure 2). In addition to high PBMC recovery, it is also important to have minimal contamination from red blood cells (RBCs) and platelets. Average percent depletion of RBCs was 99.6% and 82.5% for platelets (Figure 3).

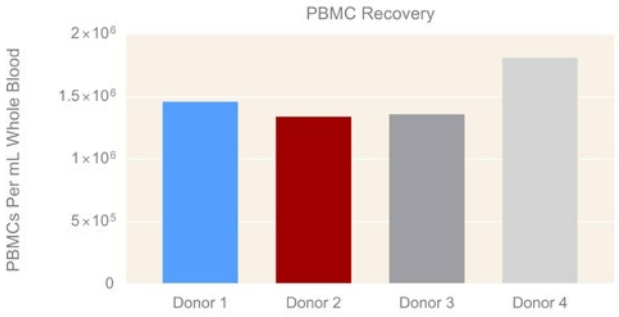

Figure 1. PBMC recovery from 4 separate donors. PBMC recovery from 240 mL of whole blood using Corning X-LAB system.

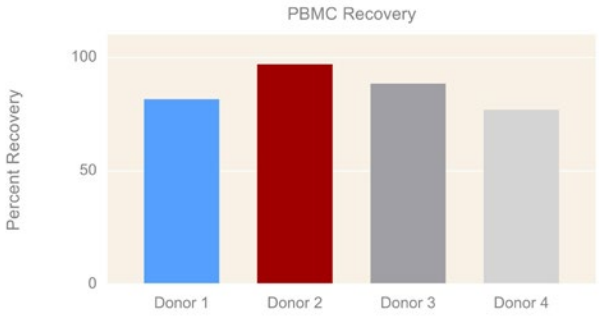

Figure 2. High PBMC percent recovery. PBMC percent recovery from 240 mL of whole blood using Corning X-LAB system.

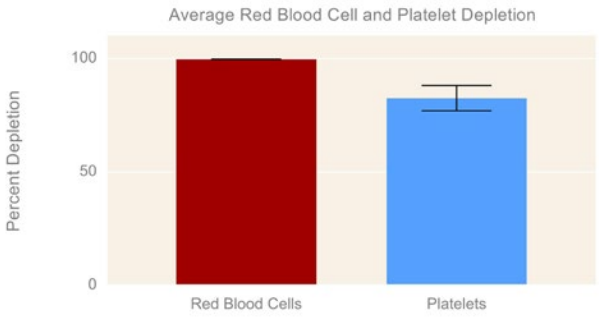

Figure 3. High RBC and platelet depletion. Average red blood cell and platelet depletion from 240 mL of whole blood. Data is average from 4 donors with standard deviations. N=4.

Conclusions

With continuous interest in immune therapy, more efficient tools for PBMC isolation will become more critical. Ideally, these tools need to keep the process as sterile as possible through closed systems and automation capabilities to reduce variability.

References

1. Bittersohl H and Steimer W. Intracellular concentrations of immunosuppressants. Personalized immunosuppression in transplantation. Elsevier (2016) 199-226.

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